

SEMICONDUCTOR FACTORY AUTOMATION SYSTEM AND METHOD FOR MONITORING
AT LEAST ONE SERVER IN REAL TIME

Field of the Invention

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The present invention relates to a semiconductor factory automation (hereinafter, referred to as FA) system; and, more particularly, to a semiconductor FA system and method for monitoring at least one server in a real time.

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Description of the Prior Art

Generally, a conventional semiconductor FA system automatically processes semiconductor wafers in order to produce semiconductor device, e.g., memory devices. The conventional semiconductor FA system includes process equipments (hereinafter, referred to as EQs), stockers and an automatic guide vehicle (hereinafter, referred to as AGV). An EQ applies a semiconductor process to the semiconductor wafers.

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A stocker stocks a semiconductor wafer cassette containing the semiconductor wafers to be processed in the EQ. Further, the stocker also stocks the semiconductor wafer cassette, which has been already processed in the EQ.

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The AGV transports the semiconductor wafer cassette to be processed from the EQ to another EQ or the stocker. Furthermore, the AGV transports the processed semiconductor wafer cassette from the EQ to the stocker.

5 In order to automatically control the above elements, e.g., the EQs, the stocker, the AGV and the like, the conventional semiconductor FA system also includes a number of control ^{Servers}~~severs~~, e.g., an operator interface server (hereinafter, referred to as OIS), an EQ server (hereinafter, referred to as EQS) and the like.

The control servers employed in the conventional semiconductor FA system have been implemented by using, e.g., software programs contained in a large scale computer or distributed in a number of personal computers constituting of a client-server system.

10 In the client-sever system, a number of personal computers are coupled to a common communication line, e.g., EthernetTM supplied by Xerox Corporation. Each personal computer includes one or more software programs, each for a control server. In this case, if a personal computer is in an error state, the control servers contained
15 in the personal computer may not perform its appropriate operation. Further, the productivity of semiconductor device may be seriously affected. Therefore, the semiconductor FA system having a client-server system strongly needs a scheme capable of monitoring operational state of the servers in a real time.

20 Summary of the Invention

It is, therefore, an object of the present invention to provide a semiconductor FA system and method for monitoring at least one
25 server in a real time so that an operator can easily locate a failure of at least one server.

In accordance with an aspect of the present invention, there

is provided a semiconductor factory automation (FA) system, comprising: at least one processor for driving a program process and providing processor state information, wherein the processor state information includes an availability of a central processing unit, an availability of a disk and a state of the program process related to said processor; a storing means for storing the processor state information in a real time; a monitoring means for retrieving the processor state information in said storing means to monitor said processor; and a displaying means for displaying the processor state information retrieved.

In accordance with another aspect of the present invention, there is provided a method for monitoring at least one server in a semiconductor factory automation (FA) system, comprising the steps of: a) providing server state information from at least one server to a real-time database, wherein the server state information includes an availability of a central processing unit, an availability of a disk and a state of a program process related to the server; b) storing the processor state information in the real-time database; c) retrieving the server state information to monitor the server; and d) displaying the server state information retrieved.

Brief Description of the Drawings

The above and other objects and features of the instant invention will become apparent from the following description of preferred embodiments taken in conjunction with the accompanying drawings, in

which:

Fig. 1 is a block diagram describing a semiconductor FA system for monitoring at least one server in a real time in accordance with the present invention;

5 Fig. 2 is a block diagram illustrating a transportation control portion shown in Fig. 1;

Fig. 3 is an exemplary view showing a screen shown in Fig. 1;

Fig. 4 is an exemplary view depicting a relationship between servers shown in Figs. 1 and 2; and

10 Fig. 5 is a flowchart showing a method for monitoring at least one server in a real time in accordance with the present invention.

Detailed Description of the Invention

15 Referring to Fig. 1, there is shown a block diagram showing a semiconductor FA system for monitoring at least one server in accordance with the present invention. As shown, the semiconductor FA system includes at least one cell, which have a predetermined number, e.g., 4, of semiconductor production bays 400. A
20 semiconductor production bay 400 is provided with EQs 204, stockers 216 and an AGV 214. The EQ 204 processes semiconductor wafers in order to obtain semiconductor devices. The EQ 204 includes, e.g., an etching equipment, a photo-lithography equipment, a furnace equipment, a physical vapor deposition (PVD) equipment, a sputtering
25 equipment and the like. A stocker 216 temporarily stores a number of semiconductor wafer cassettes. Each of semiconductor wafer cassettes has a predetermined number of semiconductor wafers, which

is referred to as a lot. The semiconductor wafer cassettes are selectively transported to the EQ 204 by using the AGV 214. The semiconductor wafer cassette stored in the stocker 216 is transported to another semiconductor production bay 400.

5 A process equipment server (hereinafter, referred to as EQS) 202 is coupled to a common communication line 500, e.g., EthernetTM supplied by Xerox Corporation. An AGV controller (hereinafter, referred to as AGVC) 212 controls the AGV 214.

The semiconductor FA system also includes a cell management
10 portion 100, a real-time database 300 connected to the cell management portion 100, a temporary storage unit 310, a history management portion 312 connected to the temporary storage unit 310 and a history database 314 connected to the history management portion 312. The cell management portion 100, the history management portion 312 and
15 the history database 314 are respectively connected to the common communication line 500 for communication therebetween.

The cell management portion 100 includes a cell management server (CMS) 206, an operator interface server (hereinafter, referred to as OIS) 201 and a data gathering server (DGS) 207. The
20 DGS 207 stores process data associated with the lot in the real-time database 300.

The real-time database 300 stores information related to states of servers such as the CMS 206, the DGS 207, the OIS 201 and the EQS 202. A monitoring server 902 retrieves the information related to
25 the states of servers in a real time. A screen 901 coupled to the monitoring server 902 displays the retrieved information related to the states of server in the real time. The state information related

to the servers includes an availability of a central processing unit (CPU), an availability of a disk, a state of a program process and a state of a connection port of transfer control protocol/internet protocol (hereinafter, referred to as TCP/IP). The state information further has a server identifier.

Referring to Fig. 2, there is shown a block diagram illustrating a transportation control portion shown in Fig. 1. As shown, the transportation control portion 116 includes intrabay control servers (hereinafter, referred to as ICSs) 210 coupled to the common communication line 500 and stocker control servers (hereinafter, referred to as SCSs) 218. The ICS 210 converts a transportation message into a transportation command from the common communication line 500. The SCS 218 generates a stocker control command to control the stockers 216 in response to the transportation command. The AGVC 212 generates an AGV control command to control an AGV 214 in response to the transportation command.

Referring to Fig. 3, there is shown an exemplary view showing a screen shown in Fig. 1. As shown, the screen 901 coupled to a monitoring server 902 shown in Fig. 1 displays states of servers such as the ICS 210, the SCS 218, the CMS 206, the OIS 201 and the DGS 207 shown in Figs. 1 and 2. Display spaces 807 display a state of a corresponding server, respectively. A display space 805 displays an availability of a CPU related to the corresponding server. A display space 806 displays an availability of a disk related to the corresponding server. When the disk, related to the corresponding server, has failed, a light emitting device 801 emits a light of a red color. Further, when the disk, related to the corresponding

server, has not failed, the light emitting device 801 emits a light of a green color.

When a program process related to the corresponding server is in a down state, a light emitting device 803 emits the light of the red color. Further, when the program process, related to the corresponding server, is not in the down state, the light emitting device 803 emits the light of the green color.

When a communication between the monitoring server 902 and the corresponding server is disconnected, a light emitting device 804 does not emit the light. Further, when the communication between the monitoring server 902 and the corresponding server is connected, a light emitting device 804 emits the light. A display space 808 displays a name of the program process of the down state.

Referring to Fig. 4, there is shown an exemplary view depicting a relationship between servers shown in Figs. 1 and 2. As shown, the monitoring server 902 has transfer control protocol/internet protocol (hereinafter, referred to as TCP/IP) 1000 to communicate with the EQS 202, the ICS 210 and the SCS 218. Similarly, the EQS 202, the ICS 210 and the SCS 218 have the TCP/IP 1000, respectively.

Further, the EQS 202, the ICS 210 and the SCS 218 include a state information monitor 1001, a CPU 1002 and a disk 1003, respectively.

The state information monitor 1001 monitors an availability of the CPU 1002, an availability of the disk 1003, a program process and a connection port of the TCP/IP 1000. The state information monitor 1001 sends the availability of the CPU 1002, the availability of the disk 1003, a state of the program process and a state of the connection port of the TCP/IP 1000 to the monitoring server 902.

Referring to Fig. 5, there is shown a flowchart showing a method for monitoring at least one server in a real time in accordance with the present invention.

As shown, at step S402, the servers such as the CMS 206, the DGS 207, the OIS 201 and the EQS 202 send information related to states of the servers to the real-time database 300.

At step S404, the real-time database 300 stores the information related to the states of the servers.

At step S406, the monitoring server 902 retrieves the information related to the states of servers in a real time.

At step S408, the screen 901 displays the retrieved information related to the states of the servers in the real time. The state information related to the servers includes an availability of a CPU, an availability of a disk, a state of a connection port of TCP/IP and a state of a program process. The state information further a server identifier.

Although the preferred embodiments of the invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.